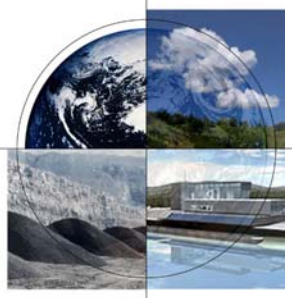
Clean Coal Power Initiative Round 3



Technical Lessons Learned

Public Workshop
November 1, 2007

Wolfe Huber, Project Manager
National Energy Technology Laboratory

CCPI Technical Lessons Learned
Commercial Demonstration

- **Some applications did not propose a *commercial demonstration*.**
  - Some projects were slip stream evaluations of developing technologies.
  - Some projects were long-term R&D projects with little more than a concept proposed, which would progress through small scale, pilot scale, and finally commercial scale demonstration under proposed program.

- **Successful applications propose a technology that has a sufficient data base to support its readiness for commercial demonstration.**
- **Projects should be of sufficient scale to demonstrate commercial operation and viability.**

CCPI Technical Lessons Learned
Technology Advancement

- **It was not clear how some proposed projects offered *significant advancement* over current state-of-the-art.**
  - Some proposed technology was not compared directly with commercial technology for cost and performance.
  - Some proposed technology appeared to be an alternative method with no clear advancement, or a technology that addressed a site specific problem.

- **Successful applications clearly compare technology advancements with current state-of-the-art, which is represented by commercial technology as well as successfully completed demonstrations (CCT & CCPI).**
- **Advancements should offer potential for wide commercial deployment following demonstration.**

CCPI Technical Lessons Learned
Discuss Project Concept

- **Some applications were conceptual in nature, much *detailed information* was missing, such as:**
  - flow diagrams,
  - energy and material balances,
  - temperatures, pressures, compositions of major streams,
  - and process chemistry and engineering concepts.
  - Some literature reviews did not characterize state-of-the-art or provide added insight to proposed commercial demonstration.

- **Successful applications provide detailed technical information sufficient to allow a complete understanding of process or technology being proposed for commercial demonstration.**

CCPI Technical Lessons Learned
Low Cost

- ***Many*** **applications proposed technology that was claimed to be *low cost*.**
  - However, low cost was often not justified through detailed comparison with commercial technology. Arguments for low cost were often not substantiated.
  - Some applications did not justify low cost claims in technical section, but referred instead to cost section, which is a "project cost" as opposed to a technology cost.

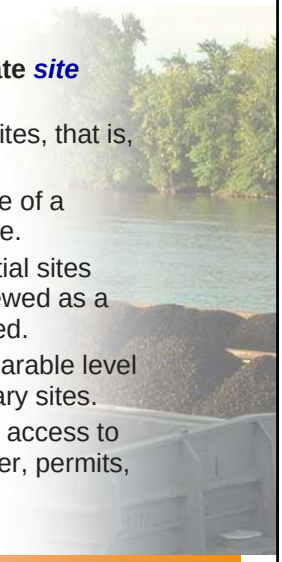
- **Successful applications provide detailed explanations and quantitative comparisons to commercial technology to substantiate low cost claims.**

CCPI Technical Lessons Learned
Provide Data

- **Many applications lacked *sufficient data*, and data was often presented without context.**
  - Technologies lacking data are not ready for commercial demonstration.
  - Laboratory data is generally insufficient to support commercial demonstration.
  - Data was often presented without comparison to commercial technology performance, without reference to parametric studies, and without statistical evaluation.

- **Successful applications provide parametric studies showing process performance, data from pilot scale to support commercial demonstration, and data to support advancements over commercial technology.**

CCPI Technical Lessons Learned
Project Site



- **Some applications failed to provide adequate *site definition and documentation*.**
  - Some applications did not identify specific sites, that is, California is not a site.
  - Some applications failed to provide evidence of a business relationship with proposed host site.
  - Some applications proposed multiple potential sites without proposing a primary site. This is viewed as a weakness in that project is not clearly defined.
  - Some applications failed to document comparable level of information for alternate sites as for primary sites.
  - Some applications did not clearly document access to coal infrastructure, power transmission, water, permits, etc.

CCPI Technical Lessons Learned
Project Site (Cont.)

- **Successful applications document quality of proposed site.**
  - A site is:
    - An existing power generation facility (or other facility as appropriate).
    - A parcel of land whose ownership can be clearly identified and is suitable for building proposed project.
  - A site is available as demonstrated by ownership, a signed lease, option to buy, or a letter of participation from owner.
  - A primary and suitable site is well characterized, and all potential alternate sites are equally well characterized.
  - A site has access to all necessary infrastructure.

CCPI Technical Lessons Learned
Statement of Project Objectives

- **Some *Statements of Project Objectives* (also called Statements of Work) did not clearly state what work was to be performed under project.**
  - Some Statements of Project Objectives were brief, with insufficient detail in task structure.
  - Some Statements of Project Objectives contained too much explanation of process.
  - Milestones, decision points, and intermediate goals were also lacking.

- **Successful applications include a Statement of Project Objectives that clearly describes work to be performed at WBS Level 3, (Task 4.2.1) including decision points.**

CCPI Technical Lessons Learned
Test Plans

- ***Test Plans* were virtually non-existent in some applications.**
  - Many applications did not include a description of parametric testing for system optimization.
  - Many applications took “build it and run it” approach.

- **Successful applications include a plan for operation over a range of conditions, including coal types.**
- **Parametric testing to optimize demonstration plant performance and to show applicability beyond specific site is desirable.**

CCPI Technical Lessons Learned
Project Definition Phase

- **Some applicants misunderstood *Project Definition Phase (PDP),* which is for finalizing certain activities.**
  - PDP is not appropriate for many projects of modest scope and complexity.
  - Financing, NEPA, and Permitting activities may be included in PDP.
  - All subsystem choices and a detailed schedule to allow accurate cost estimating should be finalized in a PDP.

- **Successful applications fully address all aspects of project, although some items may include a degree of uncertainty.**
- **PDP allows for finalization of these items to achieve project financing.**

CCPI Technical Lessons Learned
Project Specific Development Activities

- **Some applicants misunderstood *Project Specific Development Activities (PSDAs).* This is not an opportunity to perform basic R&D.**
  - PSDAs are performed at existing facilities.
  - PSDAs include design verification, materials selection, performance definition, and evaluation of alternative design features.
  - PSDAs are limited to 10% of DOE funding.

- **Successful applications propose technology that is ready for commercial demonstration with only minor issues to be resolved through PSDA.**